

VI.5.5A-FFGUID FLASH FLOOD GUIDANCE EXECUTION (Program FFGUID)

The execution menu in the FFGUID program controls the computation of flash flood guidance using threshold runoff and rainfall-runoff curves.

Threshold runoff was previously defined as parametric information. Rainfall-runoff curves are computed by NWSRFS with the Flash Flood Guidance Technique set to FFG(1) or FFG(2).

Execution Menu

Flash flood guidance values are computed through the FFG Computation Menu and a sub-menu. The main menu is shown as follows:

```

      N A T I O N A L   W E A T H E R   S E R V I C E
      F L A S H   F L O O D   G U I D A N C E   S Y S T E M

      Program ffguid - Release x.xx
      FFG Computations Menu

      ofs_level: oper                      ffg_level: oper

      C - Compute all

      G - Gridded FFG
      A - Area FFG
      H - Headwater FFG
      W - Water Supply Guidance

      S - Setup Menu

      Select (<return>-exit):
```

OFS_LVL and FFG_LVL indicate the set of files selected by environmental variables for the OFS database and the FFGS database, respectively.

The purpose and description of each item on the FFG Computation Menu follows.

C - Compute all

Flash flood guidance computations are performed in the sequence grids, areas, and headwaters. Descriptions of each type of guidance are given below.

G - Gridded FFG

Gridded flash flood guidance values are computed for all HRAP bins in an RFCs area as determined from the HRAP coordinates defined by item U - User Info. The sequence of the gridded computations is controlled by the defined FFG operations in OFS and each operations reference to an MAP basin boundary.

A - Area FFG

Area guidance values are computed from all the gridded guidance values within a boundary defined for an area. An area can be a county or urban area, etc. A boundary must be defined in OFS for the area using the basin boundary type BASN. The area guidance values can be the minimum gridded guidance value or the average of the gridded guidance values within the boundary as selected in the U - User Info Menu (a sub-menu of the Setup Menu). The computational sequence is controlled by the area definitions of type AFFG in FFGS.

H - Headwater FFG

Headwater guidance values are computed using defined parameters for the headwaters of type HFFG in FFGS. Optional adjustments are set in the U - User Info Menu (a sub-menu of the Setup Menu). The computational sequence is controlled by the HFFG definitions.

S - Setup Menu

This selection displays the Setup Menu.

Gridded FFG Error and Warning Messages

Gridded runoff is initially defined as -9.90. These values are replaced when actual gridded runoff is defined. Any part of the HRAP grid window not in an RFCs forecast area will retain the -9.90. These areas are generally in the corners of the HRAP window that includes the RFC's area.

When gridded guidance is computed, the gridded field is initially set to -9.8 for all bins. As the computations proceed, the -9.8 is replaced with valid gridded rainfall amounts. Gridded rainfall is set to -9.0 for those bins whose gridded runoff is -9.90. Therefore, the gridded rainfall amounts will be as follows:

Rainfall	Reason
=====	=====
0.1 to 20.0	valid range of computed guidance
-9.8	no computation made (outside RFC's area)
-9.0	no runoff defined

Gridded guidance is computed by flash flood guidance areas (FFG operations) and summarized as:

```
ffgid grids cptd 259, noro 0, total 259
```

where cptd is the number of gridded values computed
noro is the number of grids with undefined runoff, and
total is the sum of cptd and noro

bins in the ffgid area.

Gridded guidance for ffgid was computed for all bins in the geographic area for ffgid. This represents the ideal situation.

For ffgid areas on the borders of RFC areas, summaries may appear as:

```
ffgid grids cptd 112, noro 30, total 142
```

In this case, gridded guidance was computed for 112 grids but not computed for 30 because no runoffs were defined. These no-runoff bins remain undefined because they are not in the RFC's area of responsibility. If these bins were in an interior ffgid area, then the runoff probably needs to be defined.

The following examples describe the ERROR and WARNING messages:

Example 1A:

If no runoffs have been defined for all the bins in an ffgid, then the summary appears as:

```
***ERROR* ffgid grids cptd 0, noro 178, total 178
```

Corrective action:

1. If the ffgid area is in the RFC's forecast area, then define the runoffs.
2. Otherwise, delete the ffgid for the area.

Example 2A:

With debug on

```
*** ERROR ***
```

```
No runoff defined in SEEM7 at natl row/col 405 694
```

This message appears for each bin when guidance cannot be computed because the gridded runoff is -9.90, i.e. undefined.

Corrective Action: Define runoff for the indicated bin.

Example 3A:

```
**** ERROR **** ERROR ****
      No rainfall-runoff curve for 'ffgid'      istat=n
```

Corrective Action:

1. Run OFS with FFG technique set to 1 or 2 (istat=7), OR
2. Define the FFG operation represented by 'ffgid' (istat=2)

Example 4A:

```
**** ERROR **** ERROR ****
      Flash flood guidance operation never run for 'ffgid'
      istat=7
```

Corrective Action: Run OFS with FFG Technique set to 1 or 2

Example 5A:

```
**WARNING** MDYH1 or MDYH2 CALLED WITH ARGUMENTS OUT OF RANGE...
*** WARNING ***
BAUM5      LFFCPD: 12/31/1899 12z  Int day/hr:      0/0  Julian hr: -999
```

This message appears when the segment (identifier BAUM5) has never been run with the FFG Technique set to 1 or 2. This message also appears if the FFG Technique has been run recently but not for the current date. In this case LFFCPD will be the date the FFG operation was last run prior to today.

Corrective Action: Run the segment with the FFG technique set to 1 or 2. There may be a problem in the segment that keeps it from running.

Area FFG (Zones & Counties) Errors and Warnings

Area guidance is the average (or minimum) of the gridded guidance values for all the bins within the area boundary. Computations for an area are shown as:

```
MNC081    2.7  3.1  3.4
           Grid ncptd 115  nocpt  0  noro  0  total 115
```

where ncptd is the number of grids having valid guidance values
nocpt is the number of grids where guidance not computed, runoff defined
nororo is the number of grids with undefined runoff
total is the sum of all grids in the area boundary

Area guidance for MNC081 was computed from all 115 bins in the county boundary. This represents the ideal situation.

The counter variables for area guidance computations are summarized below:

Bin ffg	Counter
=====	=====
0.004 < ffg < 20.0	ncptd
-9.8 <= ffg < -9.0	nocpt
-9.0 = ffg	noro

When ncptd is 0, then area guidance is set to:

-9.2 when only nocpt > 0
-9.4 when only noro > 0
-9.6 if nocpt and noro both > 0

The following examples with explanations represent other situations:

Example 1B:

```
MIC063  1.3  1.5  1.8
      ** WARNING Grid ncptd   78  nocpt 13  noro  0  total  91
```

The area guidance for MIC063 was computed from the 78 valid gridded guidance values found in the area boundary. Gridded guidance was not computed for thirteen (13) bins. The RFC either has no segment(s) defined that includes these 13 bins or the segment(s) did not execute for some reason.

Corrective Action:

1. Define segment(s) that include the bins, OR
2. Verify that existing segments are executing completely.

Example 2B:

```
NDC009 -9.2 -9.2 -9.2
      ** WARNING Grid ncptd    0  nocpt 93  noro  0  total  93
```

None of the 93 bins in NDC009 are defined in the RFC's forecast segment(s) or the segment(s) did not execute.

Corrective Action:

1. The area belongs to another RFC. Delete from definition. OR
2. Define segment(s) to include the area.

Example 3B:

```
NDC035 -9.6 -9.6 -9.6
      ** WARNING Grid ncptd    0  nocpt 86  noro 34  total 120
```

The 86 bins were not included in any of the RFC's area. Another 34 bins had no runoff defined.

Corrective Action:

1. Since a majority of the bins are not in the RFC's area, delete the area from the RFC because it may belong to another RFC.
OR

2. Define gridded runoff for the 34 bins and verify that segments are defined that include these bins.

Example 4B:

```
INC003 -9.4 -9.4 -9.4
      *** ERROR *   Grid ncptd      0   nocpt  0   noro 106   total 106
```

No gridded runoff was defined for the 106 bins in the area.

Corrective Action: Define gridded runoff for the area.

Headwaters FFG Errors and Warnings

Example 1C:

```
**** ERROR **** ERROR ****
      No rainfall-runoff curve for 'ffgid'      istat=n
```

Corrective Action:

1. Run OFS with FFG technique set to 1 or 2 (istat=7), OR
2. Define the FFG operation represented by 'ffgid' (istat=2).

Example 2C:

```
**** ERROR **** ERROR ****
      Flash flood guidance operation never run for 'ffgid'      istat=7
```

Corrective Action: Run OFS with FFG Technique set to 1 or 2.

Example 3C:

```
**** ERROR **** ERROR ****
      Rating curve definition for 'rcid' not found.
```

Corrective Action:

1. Enter the correct rating curve identifier in the headwater definition, OR
2. Define the rating curve in OFS, OR
3. Define the flow at flood stage instead of the rating curve identifier in the headwater definition.

Example 4C:

```
* WARNING *
      Forecast flows for 'qtsid' type 'flows' not found.  istat=n
```

Corrective Action:

1. Check that the forecast flow time series identifier and type code are defined correctly for the headwater

2. Check that the identifier and type code are defined in the segment.

Example 5C:

```
* WARNING *      high precip, low runoff
  'hdid      ' 'ffgid      ' t  x.xx x.xx x.xx x.xx x.xx x.xx x.xx x.xx
```

where 'hdid ' is the headwater identifier
 'ffgid ' is the flash flood area identifier (FFG operation id)
 x.xx x.xx are the four pairs of points that define the
rainfall-runoff curve

Computed guidance is greater than 20.0.

Corrective Action: Check that snow and rainfall-runoff model
parameters are correct.